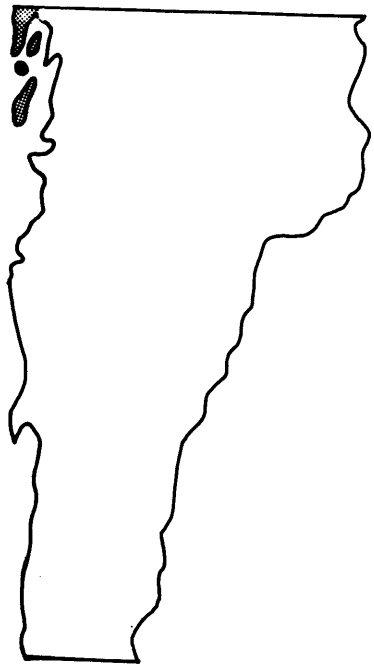
FLOOD INSURANCE STUDY

TOWN OF NORTH HERO, VERMONT
GRAND ISLE COUNTY



FEBRUARY 1980

FEDERAL EMERGENCY MANAGEMENT AGENCY
FEDERAL INSURANCE ADMINISTRATION
COMMUNITY NUMBER - 500225

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1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Town of North Hero, Grand Isle County, Vermont, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study will be used to convert North Hero to the regular program of flood insurance by the Federal Insurance Administration (FIA). Local and regional planners will use this study in their efforts to promote sound flood plain management.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than those on which these federally-supported studies are based. These criteria take precedence over the minimum federal criteria for purposes of regulating development in the flood plain, as set forth in the Code of Federal Regulations at 24 CFR, 1910.1(d). In such cases, however, it shall be understood that the state (or other jurisdictional agency) shall be able to explain these requirements and criteria.

1.2 Authority and Acknowledgements

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were prepared by Dufresne-Henry Engineering Corporation for the Federal Insurance Administration, under Contract No. H-4571. This work, which was completed in March 1979, covered all significant flooding sources in the Town of North Hero.

1.3 Coordination

An initial Consultation and Coordination Officer's (CCO) meeting was held on April 12, 1978, between representatives of the FIA, the study contractor, and the town, in order to determine the areas to be studied by detailed and approximate methods. The Vermont Department of Water Resources, the New York State Department of Environmental Conservation, and the Franklin County Regional Planning

Commission were notified of the study, and requested to supply any pertinent information. The U. S. Department of the Interior, Fish and Wildlife Service, was contacted to obtain available topographic mapping of the detailed study area. The community was requested to submit data concerning flood hazards, flooding experience, plans to avoid potential flood hazards, and any other data deemed appropriate. Periodic contacts were made with local community officials to keep them informed of the progress of the study and to solicit pertinent information. The State of Vermont forwarded information concerning flood elevations on Lake Champlain. The study contractor attended a meeting on November 10, 1976, on Lake Champlain study methods conducted by representatives of the FIA in Montpelier, Vermont.

A final CCO meeting, attended by representatives of the FIA, the community, and the study contractor was held on August 30, 1979 to resolve any problems or conflicts with the results of this study and to provide an opportunity for local community officials to become familiar with the planning material provided.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Town of North Hero, Grand Isle County, Vermont. The area of study is shown on the Vicinity Map (Figure 1).

Lake Champlain was studied by detailed methods. The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction for the next five years, through March 1984.

2.2 Community Description

The Town of North Hero is a 12.5 square mile island in Lake Champlain, which includes two small uninhabited islands, Butler and Knight Islands. The Town of North Hero is located in central Grand Isle County, in northwestern Vermont. It is surrounded on the west by Clinton County, New York, on the north by the Town of Alburg, Vermont, on the east by the Towns of Swanton and St. Albans, and on the south by the Town of Grand Isle, Vermont. The 1975 population

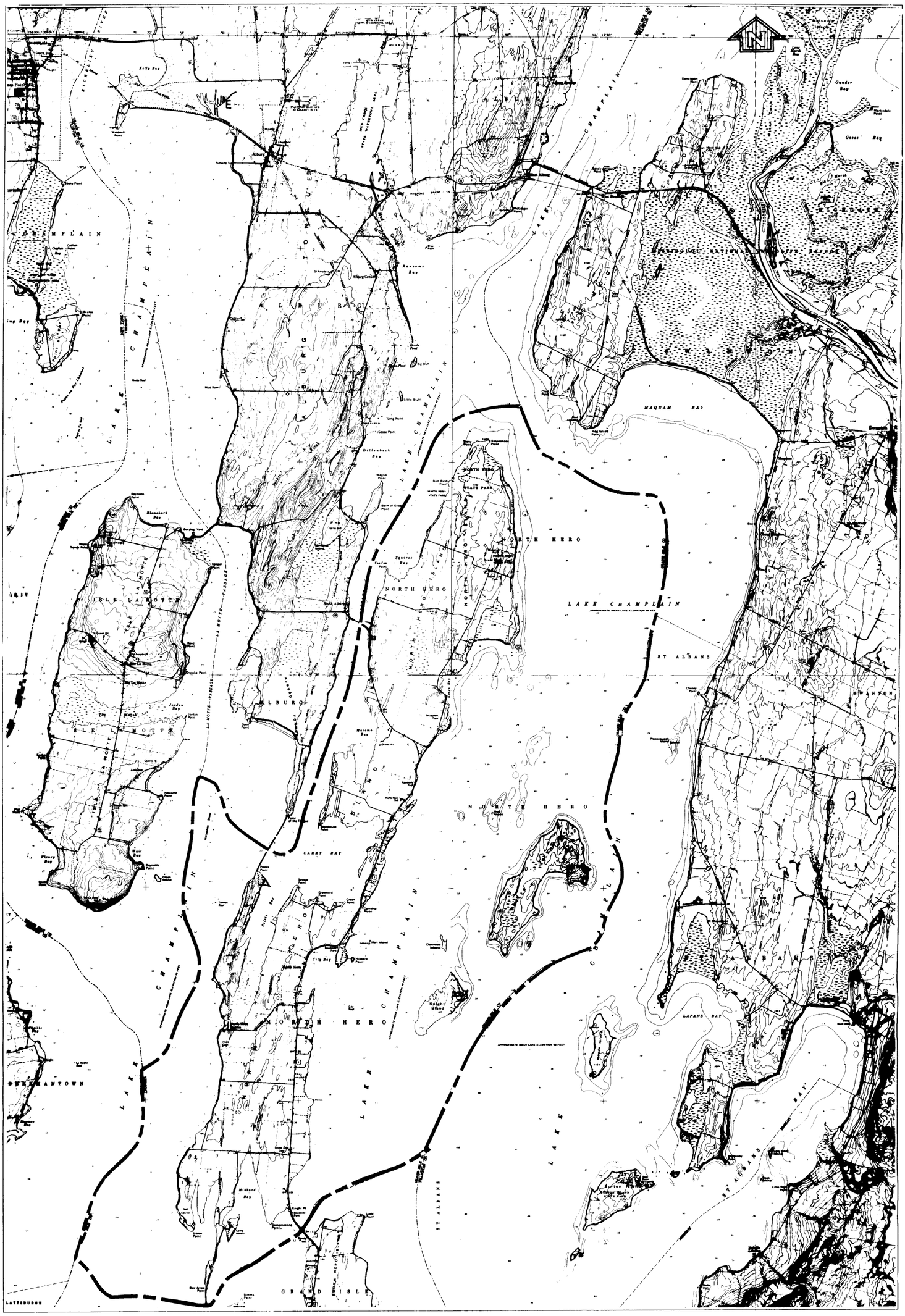

FIGURE 1

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

TOWN OF NORTH HERO, VT
(GRAND ISLE CO.)

APPROXIMATE SCALE

6666 0 6666 13332

VICINITY MAP

estimate of 392 represents an 8-percent increase over the 1970 census according to a newspaper article of May 1977 (Reference 1). The population of the town is fairly well distributed along the Lake Champlain shore, with a small concentration in the village area.

The climate of this region is influenced by Lake Champlain, the Green Mountains and the Adirondacks. Lake Champlain has a significant moderating effect on the climate, extending the growing season to 160 days. Because the weather patterns are affected by the Green Mountains and the Adirondacks, along with some influence from the Taconic Mountains to the south, this valley is protected from most northeasters and tropical storms. The prevailing surface winds are generally from the south with frequent shifts to the north during the winter. Winter snows average 60 to 70 inches annually. The average annual precipitation is 33 inches. The average annual temperature is 46.3 degrees Fahrenheit (°F). During the months, May through September, the monthly mean is greater than 55 °F. During the months, December through February, the monthly mean is less than 25 °F (Reference 2).

Topography within the town is fairly uniform with gently rolling hills. The high point in North Hero is on Butler Island at an elevation of 175 feet. The region is underlain by either sandstone and quartzite of Cambrian age or by shale, slate, and limestone of Ordovician age. The soils in North Hero are primarily derived from silt and clay deposited in post-glacial Lake Vermont (Reference 3).

The island of North Hero has intermittent streams that flow into Lake Champlain, which is the sixth largest body of fresh water in the United States. The lake has a surface area of 490 square miles and is over 100 miles long, measured from the northern end at Rouses Point where it enters the Richelieu River to the southern end near Lock 12C of the New York State Barge Canal System.

Grand Isle County has some of the best agricultural land in the State of Vermont, and agriculture is the most important enterprise in the Town of North Hero. A large portion of the cropland is used to grow corn and hay in support of dairy farming. Several apple orchards are located close to Lake Champlain (Reference 3).

2.3 Principal Flood Problems

Flood damage in the Town of North Hero has been caused primarily by high levels of Lake Champlain and the consequent erosion of the bank materials along the shore. High lake levels compounded by wave and ice action has caused the flooding of some recreational properties

near Squires Bay, Savage, Grave Yard, Bow Arrow, Pelots, and Holiday Points in April and May of 1971, 1972, and 1976. The rise in lake level is often associated with sudden snowmelt in the mountains which result in an enormous volume of water released from the mountainous and large (8,277 square miles) drainage area of Lake Champlain.

2.4 Flood Protection Measures

There were no flood control structures existing or authorized in the Town of North Hero at the time of this study.

3.0 ENGINEERING METHODS

For the flooding source studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data for this study. Flood events of a magnitude which are expected to be equalled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for flood plain management and for flood insurance premium rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equalled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than one year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (one-percent chance of annual occurrence) in any 50-year period is about 40 percent (four in ten) and, for any 90-year period, the risk increases to about 60 percent (six in ten). The analyses reported here reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic and Hydraulic Analyses

Hydrologic analyses were carried out to establish the peak elevation-frequency relationships for floods of the selected recurrence intervals for the flooding source studied in detail affecting the community.

Analyses of the levels of Lake Champlain were adopted from the City of Plattsburgh Flood Insurance Study and the Regulation of Lake Champlain and the Upper Richelieu River prepared by the International Champlain Richelieu Board (References 4 and 5). Data used in this study were obtained from gaging stations at Rouses Point, New York, and Burlington, Vermont (Reference 4). A summary of elevation-frequency relationships for Lake Champlain is shown in Table 1, "Summary of Elevations."

TABLE 1 - SUMMARY OF ELEVATIONS

FLOODING SOURCE AND LOCATION	ELEVATION (FEET) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
LAKE CHAMPLAIN				
Town of North Hero	101.2	101.9	102.0	102.3

The analyses reported herein reflect still water elevations but do not include the effect of wind-generated waves and runup. Nonetheless, this additional hazard due to wave-action effect should be considered in the planning of future development.

All elevations used in this study are referenced to the National Geodetic Vertical Datum of 1929 (NGVD), formerly referred to as Sea Level Datum of 1929. Locations of the elevation reference marks used in the study are shown on the maps.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages state and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study includes a flood boundary map designed to assist communities in developing sound flood plain management measures.

4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by the FIA as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community. The 100- and 500-year boundaries were delineated using topographic maps of the study area at a scale of 1:24,000, photo-enlarged to a scale of 1:9,600, with a contour interval of 10 feet (Reference 6). In cases where the 100- and 500-year flood boundaries are close together, only the 100-year boundary has been shown.

Flood boundaries are indicated on the Flood Insurance Rate Map. On this map, the 100-year flood boundary corresponds to the boundary

of the areas of special flood hazards (Zone A2), and the 500-year flood boundary corresponds to the boundary of areas of moderate flood hazards (Zone B).

Small areas within the flood boundaries may lie above the flood elevations and, therefore, may not be subject to flooding. Owing to limitations of the map scale and lack of detailed topographic data, such areas are not shown.

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, the FIA has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors (FHFs), and flood insurance zone designations for the flooding source affecting the Town of North Hero.

5.1 Reach Determinations

Reaches are defined as lengths of watercourses or waterbodies having relatively the same flood hazard. In lacustrine areas, reaches are limited to the distance for which the difference between the 10-year and 100-year flood elevation does not vary more than 1.0 foot. Using these criteria, the shoreline of North Hero qualifies as one reach whose flooding source is Lake Champlain. The location of this reach is shown on the Flood Insurance Rate Map.

5.2 Flood Hazard Factors

The FHF is the FIA device used to correlate flood information with insurance rate tables. Correlations between property damage from floods and their FHFs are used to set actuarial insurance premium rate tables based on FHFs from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations expressed to the nearest 0.5 foot, and shown as a three-digit code. For example, if the difference between water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year water-surface elevations is greater than 10.0 feet, accuracy for the FHF is to the nearest foot.

5.3 Flood Insurance Zones

After the determination of reaches and their respective FHFs, the entire incorporated area of the Town of North Hero was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations:

Zone A2: Special Flood Hazard Areas inundated by the 100-year flood, determined by detailed methods; base flood elevations shown, and zones subdivided according to FHF.

Zone B: Areas between the Special Flood Hazard Area and the limits of the 500-year flood, including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; also, areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; and areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.

Zone C: Areas of minimal flooding.

Table 2, "Flood Insurance Zone Data," summarizes the flood elevation differences, FHFs, flood insurance zones, and base flood elevations for the flooding source studied in detail in the Town of North Hero.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the Town of North Hero is, for insurance purposes, the principal result of the Flood Insurance Study. This map contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by the FIA.

6.0 OTHER STUDIES

Analysis of flood elevations for this study were adopted from the Flood Insurance Study for the City of Plattsburgh, New York, and a technical

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Lake Champlain Reach 1	05,15,25,30	-0.8	-0.1	+0.3	010	A2	102

[1]Flood Insurance Rate Map Panel
[2]Weighted average
[3]Rounded to the nearest foot - see map

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

TOWN OF NORTH HERO, VT
(GRAND ISLE CO.)

FLOOD INSURANCE ZONE DATA

LAKE CHAMPLAIN

report prepared by the International Champlain Richelieu Board (References 4 and 5). All elevations in the study are in exact agreement with elevations of the previous studies.

Flood Insurance Studies are currently being conducted for the Towns of Alburg and Isle La Motte (References 7 and 8). When completed, data in these Flood Insurance Studies will be in exact agreement with data presented in this study for the Town of North Hero.

This study is authoritative for purposes of the Flood Insurance Program, and the data presented here either supersede or are compatible with previous determinations.

7.0 LOCATION OF DATA

Survey, hydrologic, hydraulic, and other pertinent data used in this study can be obtained by contacting the office of the Federal Insurance Administration, Regional Director, Region I Office, 15 New Chardon Street, Boston, Massachusetts 02114.

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